REMARKS

This is in full and timely response to the above-identified Office Action. The above listing of the claims replaces all prior versions, and listings, of claims in the application. Reexamination and reconsideration in light of the proposed amendments and the following remarks are respectfully requested.

Claim Amendments

In this response, the claims have been revised to clarify the subject matter which is set forth therein and to overcome the objection set forth in paragraph #2 of this Office Action.

Rejections under 35 USC § 102

The rejection of claims 2, 11 and 15-20 under 35 USC § 102(e), as being anticipated by Padmanaban et al. (hereinafter Padmanaban) is, to the extent that it still applies to the claims as amended, respectfully traversed.

The rejection cites ArF-1 from Clariant Corp as anticipating the claimed bottom anti-reflective coating solution. Contrary to the position taken in this rejection that ArF-1 is a well known fluorinated polymer of poly(aromatic ether) (viz., FPAE), there is nothing in Padmanaban to disclose that the product from Clariant Corp designated ArF-1 actually contains fluorine. It is respectfully submitted that the rejection immediately fails to establish a *prima facie* case of anticipation.

In fact, the USPTO web site search has revealed only 10 hits which contain the term "ArF-1", one of which is USP 5,049,435 to Uno, et al. issued September 17, 1991, which discloses "ARF-1" as being "poly(m-phenylene isophthalamide fibrous binder."

In addition, a review of the Clariant web site indicates that their product line does not include "ArF-1". Appendix A appended to this response lists all of the products that start with the letter "a" that are currently available. Also a Google® search and the USPTO web site search revealed that ArF-1 is often used to designate a protein which is used in life science technologies. It is therefore suggested that there is insufficient disclosure relating to ArF-1 to render it enabled it to be a reference under 35 USC § 102.

Thus, unless it can be shown that the cited material ArF-1 actually contains fluorine and is suitable for use in the manner purported, via the citation of a reliable reference, the rejection should be withdrawn.

Rejections under 35 USC § 103

1) The rejection of claims 2, 11 and 15-20 under 35 USC § 103(a) as being unpatentable over Fujie et al. in view of Padmanaban et al. is respectfully traversed.

Fujie et al. discloses a substrate dependence reducing agent for chemical amplified type resist and merely discloses that the agent is to be added into the resist to improve its substrate dependence. The objects and effects of this reference are different from those of the present invention.

In this rejection, it is argued that Fujie et al. discloses a method of producing semi conductive devices by coating a fluorinated photoresist composition solution onto a silicon waver substrate. The abstract, column 2, lines 6-47, is cited along with column 1, lines 5-63, to support this position. The rejection further argues that Fujie et al. discloses a fluorinated polymer as long as it is optically transparent at the desired wavelength and cites column 18, lines 55-65; column 6, lines 43-67; and column 7, lines 47-49.

However, none of the cited sections of Fujie et al. support the position taken in this rejection. In fact the only mention of fluorine in Fujie et al. seems to reside in a list of halogens or a list of different compounds. In some of the examples a fluorine containing non-ionic surfactant is listed. Therefore, it is unreasonable to assert that the sections which are quoted (or any other disclosure found in Fujie et al.) would lead the hypothetical person of ordinary skill to the conclusion advanced in connection with the rejection of claim 15.

More specifically, the cited sections are as follows:

Abstract:

> This invention relates to a substrate dependence reducing agent useful as the constituent of a chemical amplified type resist composition used for production of semiconductor devices, etc., which comprises a compound

containing in the molecule at least one structure in which at least one of the direct links of --NH-- is directly bonded to at least one member selected from the group consisting of --C(=O)--, --C(=S)-- and --SO_2 --. When a resist composition containing said agent is used on a special substrate such as a TIN substrate or a BPSG substrate as a resist material for exposure to deep UV or KrF excimer laser beams, the resist composition can give a good profile of pattern of quarter micron order without causing footing, while retaining high resolution ability and high sensitivity.

Column 1 lines 5-63:

This invention relates to a substrate dependence reducing agent useful as the constituent of a chemical amplified type positive- or negative-working resist composition used for production of semiconductor devices, etc., a resist composition containing said agent, and a pattern formation process using the resist composition.

In place of a source of i-line light (365 nm), a KrF excimer laser having a shorter output wavelength of 248 nm has recently come to be used as a light source for exposure used in a lithography process because of a demand for ultramicrofabrication caused with an enhancement of the degree of integration of semiconductor devices. Consequently, conventional dissolution-inhibiting type resists which require exposure at several hundreds milli-joule have become unusable for, for example, the following reasons: no high energy can be obtained because the excimer laser is used in place of a mercury vapor lamp; and the resists strongly absorb light (namely, they are poor in transmittance) at 248 nm. Therefore, there have come to be used chemical amplified type resists which have a high

transmittance even at 248 nm and permits pattern formation by exposure at several tens milli-joule.

The chemical amplified type resists, however, tend to be affected by a substrate because they have a reaction mechanism in which a dissolution-inhibiting compound such as an alkali-insoluble compound or an alkali-insoluble polymer becomes alkali-soluble owing to exposure energy during pattern formation, i.e., a two-step reaction mechanism in which an acid is generated from a photosensitive compound, on account of the exposure energy, and a chemical reaction is caused by the generated acid, so that the alkali-insoluble compound or polymer becomes alkali-soluble. That is, the decrease of the exposure dose enhances the influence of a subtle difference of the exposure dose in the boundary surface portion of the substrate and the influence of a basic substance and water which are released from the substrate. Therefore, in device production using the chemical amplified type resist, it becomes impossible to attain a good profile of pattern by using a special substrate (e.g. TiN, BPSG, etc.) which has been extraordinarily disadvantageous. Such substrate dependence is a serious problem.

For solving this problem, there have been proposed resist compositions containing an organic carboxylic acid (for example, JP-A 9-6001, JP-A 9-6002, JP-A 9-6003 and European Patent Laid-Open No. 679951), and it has been reported that the resist compositions improve a profile of pattern on a special substrate. These resist compositions containing an organic carboxylic acid, however, are disadvantageous in that since the organic carboxylic acid is utilized for causing a chemical reaction to reduce the

substrate dependence, the resist compositions are strongly acidic and hence deteriorated in performance characteristics during storage. For alleviating this disadvantage, a basic compound should be added in an amount larger than that required for neutralizing the organic carboxylic acid, resulting in causing problems such as a sensitivity decrease, etc.

Accordingly, there is desired the development of a highly sensitive resist composition which gives a pattern with an excellent profile even on a special substrate and has an excellent storage stability and a satisfactory throughput.

Column 2, lines 6-47:

The present invention was made for solving the above problem and includes the following items.

(1) An agent for reducing the substrate dependence of a resist which comprises a compound containing in the molecule at least one structure in which at least one of the direct links of --NH-- is directly bonded to at least one member selected from the group consisting of --C(=O)--, --C(=S)-- and $-SO_2$ --.

(2) A resist composition comprising a polymer capable of becoming alkali-soluble owing to the action of an acid, a compound capable of generating an acid upon irradiation with actinic radiation, a compound containing in the molecule at least one structure in which at least one of the direct links of --NH-- is directly bonded to at least one member selected from the group consisting of --C(=O)--, --C(=S)-- and $--SO_2$ --, and a solvent capable of dissolving these three components.

(3) A resist composition comprising an alkali-soluble polymer, a compound capable of becoming alkali-soluble

owing to the action of an acid, a compound capable of generating an acid upon irradiation with actinic radiation, a compound containing in the molecule at least one structure in which at least one of the direct links of --NH-- is directly bonded to at least one member selected from the group consisting of --C(=O)--, --C(=S)-- and --SO_2 --, and a solvent capable of dissolving these four components.

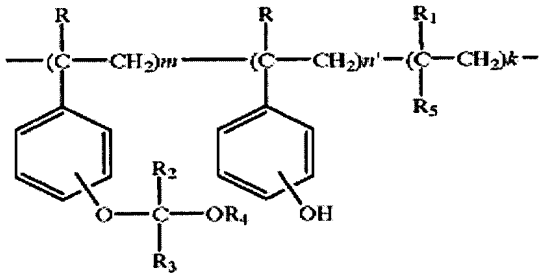
(4) A resist composition comprising an alkali-soluble polymer, a compound capable of making the polymer difficultly alkali-soluble by crosslinking therewith owing to the action of an acid, a compound capable of generating an acid upon irradiation with actinic radiation, a compound containing in the molecule at least one structure in which at least one of the direct links of --NH-- is directly bonded to at least one member selected from the group consisting of --C(=O)--, --C(=S)-- and --SO_2 --, and a solvent capable of dissolving these four components.

(5) A process for forming a pattern comprising a step of coating a semiconductor substrate with the resist composition described in any of the above items (2) to (4), a step of heating the coating to form a resist film, a step of exposing the resist film to radiation through a mask, and a step of developing the resist film with an alkali developing solution after heating the same if necessary.

Column 6, lines 43-67:

As the polymer capable of becoming alkali-soluble owing to the action of an acid which is used in the present invention, there can be exemplified by compounds represented by the following formula [5] or [6]:

[5]



wherein R and R_1 are independently a hydrogen atom or a lower alkyl group; R_2 and R_3 are independently a hydrogen atom, an alkyl group which may be substituted by one or more halogen atoms, or an aryl group, except for the case where both R_2 and R_3 are hydrogen atoms, and R_2 and R_3 may form together an alkylene ring; R_4 is a an alkyl group which may be substituted by one or more **halogen** atoms, or . . . (Emphasis added)

Column 7, line 47-49:

The halogen atom (s) in the alkyl group represented by each of R_2, R_3 and R_4 includes chlorine, bromine, **fluorine**, iodine, etc. (Emphasis added)

Column 18, lines 55-56:

The acid generators of the formula [15] include, for example, triphenylsulfonium.trifluoromethanesulfonate, triphenylsulfonium.**perfluoro**octanesulfonate, diphenyl-p-tolylsulfonium.**perfluoro**octanesulfonate, tris(p-tolyl)sulfonium.**perfluoro**octanesulfonate, tris(p-chlorobenzene) sulfonium.**trifluoro**methanesulfonate, tris(p-tolyl)sulfonium.**trifluoro**methanesulfonate, trimethylsulfonium.trifluoromethanesulfonate, dimethylphenylsulfonium.**trifluoro**methanesulfonate, dimethyl-p-tolylsulfonium.**trifluoro**methanesulfonate,

dimethyl-p-tolylsulfonium.**perfluoro**octanesulfonate, etc.
(Emphasis added)

As is clear, the above demonstrates that disclosure relating to the use of fluorine containing polymers is close to non-existent and such as to render it impossible for the hypothetical person of ordinary skill to be led by the same to the conclusion that the formation of a fluorinated photo resist *per se* onto a silicon substrate, is in fact disclosed and/or suggested.

The rejection also acknowledges that Fujie et al. is silent as to putting a bottom antireflective coating for the photo resist film, and cites Padmanaban et al. as disclosing a fluorinated photo resist composition on a bottom antireflective coated silicon substrate. However, as pointed out above in connection with the anticipation rejection, Padmanaban et al., does not provide any support for this fluorinated photo resist position.

It is therefore submitted that the sparse reference to fluorine containing materials is insufficient to support a rejection under 35 USC § 103.

To make the applicant's position even more clear, it is submitted that the person of ordinary skill in the art "thinks along the lines of conventional wisdom in the art and is not one who undertakes to innovate *Standard Oil Co. v American Cyanamid Co.*, 227 USPQ2d 293, 298 (Fed. Cir. 1985).

It is further submitted that, in order to establish a *prima facie* case of obviousness, it is necessary to show that the hypothetical person of ordinary skill would, without any knowledge of the claimed subject matter and without any inventive activity, be motivated to arrive at the claimed subject matter given the guidance of the cited references when each is fully considered as statutorily required.

This should be contrasted with the tensor of the position taken in this rejection.

As to motivation, there are three possible sources for motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) This case law, however, establishes that, even if the combination of the references may possibly teach every element of the claimed invention, without a motivation to combine, a

rejection attempting to establish a *prima facie* case of obvious must be held improper. Additionally, the level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

In this rejection, the motivation to combine Fujie et al. and Padmanaban et al. is that it would result in a photoresist [sic] device sensitive to radiation in the deep ultraviolet, particularly in the range of 100-300 nm. While is not clear what a photoresist device is *per se*, the reliance on the disclosure of Padmanaban et al. which limits the use of fluorine containing polymers to use with radiation of 157 nm, hardly supports the purported obvious range of 100 -300 nm. While a range of 156-158 nm may be envisaged, the wildly expanded 100 – 300 nm hardly seems feasible.

Further, the position that "in light of the fact that the involved references are preparing the same or similar type of fluorinated film deposition, one of ordinary skill in the art would have found it obvious to . . . " is seen as being untenable given the almost incidental/passing reference to the use of fluorinated materials in two references which are applied. Indeed, the assumption that both references are directed to fluorinated photo resist compositions to the degree that would influence the thinking of the hypothetical person of ordinary skill is untenable as evidenced by the above quotes of the disclosure which is alleged to support the position taken in this rejection.

The remaining rejections under 35 USC § 103 which are set forth in paragraphs #11 and #12 of this Office action are traversed in that they are based on the same defective basic combination discussed *supra*.

The rejections under 35 USC § 103 are also deemed untenable in that since the claims are directed to a method, each of the claimed features (steps) must be found in the art for a *prima facie* case to be established.

More specifically, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." M.P.E.P. § 2143.03. Accord M.P.E.P. § 706.02(j).

2) The two rejection of claims 3-4 and 7 under 35 USC § 103(a) as being unpatentable over Fujie et al. in view of Padmanaban et al. and further in view of Matsuo et al. is respectfully traversed.

The Matsuo et al. reference, rather than improving the rejection is such as to introduces a dilemma. More specifically, this reference discloses a coating including a fluoropolyer but discloses that this provides non-adhesivity properties to a coating formed therefrom. Inasmuch as this non-adhesivity is the antithesis of that sought by the embodiments of the invention, it is submitted that the teachings of this reference would actually result in the hypothetical person of ordinary skill being led away from the claimed subject matter.

Conclusion

The claims as they currently stand in this application in light of the amendments set forth above, are submitted as being allowable over the art of record for at least the reasons advanced above. Favorable reconsideration and allowance of this application is courteously solicited.

Respectfully submitted,

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APPENDIX A

The following is list of products advertised by Clariant Corp on their web site which start with the letter "a"

Actigard
Afilan
Agrocer
Alcloxa
Allantoin
Alresat
Aluminium
Aluprint
Anodal
Antifrogen
Antimussol (for paper)
Antimussol (for textiles)
Antimussol
Antioxidants
Antischuim
Appretan
Aqualen
Aristoflex
Arkofil
Arkofix
Arkomon
Arkopal
Arkophob
Arkostat
Arostit